NOAA Data Report ERL GLERL-19

THE MACRO- AND MEIOBENTHOS OF SOUTHEASTERN LAKE MICHIGAN NEAR THE MOUTH OF THE GRAND RIVER, 1978-79

T. F. Nalepa
M. A. Quigley

Great Lakes Environmental Research Laboratory
Ann Arbor, Michigan
June 1981

noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / Environmental Research Laboratories

NOAA Data Report ERL GLERL-19

THE MACRO- AND MEIOBENTHOS OF SOUTHEASTERN LAKE MICHIGAN NEAR THE MOUTH OF THE GRAND RIVER, 1978-79

T. F. Nalepa
M. A. Quigley

Great Lakes Environmental Research Laboratory
Ann Arbor, Michigan
June 1981

UNITED STATES DEPARTMENT OF COMMERCE
Malcolm Baldrige, Secretary

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Environmental Research Laboratories

Joseph O. Fletcher, Acting Director

NOTICE

The NOAA Environmental Research Laboratories do not approve, recommend, or endorse any proprietary product or proprietary material mentioned in this publication. No reference shall be made to the NOAA Environmental Research Laboratories, or to this publication furnished by the NOAA Environmental Research Laboratories, in any advertising or sales promotion which would indicate or imply that the NOAA Environmental Research Laboratories approve, recommend, or endorse any proprietary product or proprietary material mentioned herein, or which has as its purpose an intent to cause directly or indirectly the advertised product to be used or purchased because of this NOAA Environmental Research Laboratories publication.

CONTENTS

FIGURES

TABLES

THE MACRO- AND MEIOBENTHOS OF SOUTHEASTERN LAKE MICHIGAN NEAR THE MOUTH OF THE GRAND RIVER, 1978-79*

T. F. Nalepa and M. A. Quigley

This report is the second of a two-part series that presents the basic results of a benthos sampling program in southeastern Lake Michigan. Sediment cores were collected at monthly intervals from May to November 1978 and 1979 by divers using SCUBA. Sampling was conducted at two stations located at the 11-12 m depth interval. Organisms retained on screens with aperture openings of 595 μm , 250 μm, 106 μm, and 45 μm were counted and identified to the lowest practical taxonomic level.

Results are presented in two tables that give the following data: (1) abundance of each taxa in each replicate core (2) dry weight biomass (mg) of the major benthic groups in each replicate core.

Supplementary tables of 1976-77 sample data are also provided. These tables give the density and dry weight of epibenthic crustaceans collected in both the sediments and in the overlying waters (water in core tube). The first data report (Nalepa and Quigley 1980) gave the density and dry weight of only those collected in the sediments.

1. INTRODUCTION

This report continues the presentation of data from a benthic survey designed to determine the abundance and biomass of both the macro- and meiobenthos of southeastern Lake Michigan. The first data report in this two-part series presented data that were collected in 1976 and 1977 (Nalepa and Quigley 1980). This second report presents data collected in 1978 and 1979.

Again, the data are presented in their most basic form with no attempt at interpretation. Subsequent papers will summarize and discuss the data presented here.

*GLERL Contribution No. 264.

2. METHODS

2.1 Field and Sample Processing

While nine stations were originally sampled in 1976, only four stations were sampled in 1977 and two in 1978 and 1979. The stations sampled in 1978 and 1979 were stations 4 and 7 (fig. 1). Both stations were located in 11-12 m of water. Samples were generally taken on a monthly basis from May to November; however, some sampling periods were missed because of adverse weather conditions. The exact sampling dates and stations sampled from 1976 to 1979 are given in Table 1.

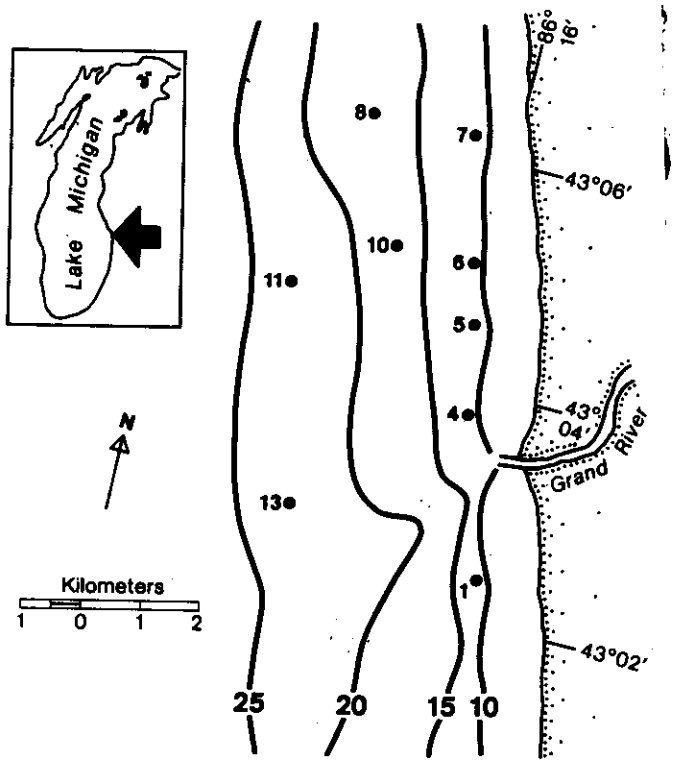

Figure 1.--*Location of sampling stations in southeastern Lake Michigan. Depth contours in meters.*

Table 1. *Sampling dates and stations sampled, 1976-79.*

Date	Station								
	1	4	5	6	7	8	10	11	13
Apr. 16, 1976	X				X				
May 17-19, 1976	X	X	X	X	X	X	X	X	X
June 23-25, 1976	X	X	X	X	X	X	X	X	X
Aug. 2-4, 1976		X		X	X	X	X		
Aug. 24-26, 1976	X	X	X	X	X	X	X	X	X
Sept. 22-24, 1976		X	X	X	X	X	X	X	X
Oct. 13-14 and 26, 1976	X	X			X	X	X	X	X
Nov. 16, 1976							X	X	
May 2-3, 1977		X			X		X	X	
June 3, 1977		X			X		X	X	
July 11, 1977		X			X		X	X	
Aug. 8-9, 1977		X			X		X	X	
Sept. 19-20, 1977		X			X		X	X	
Oct. 17, 1977								X	
Nov. 14, 1977		X			X		X	X	
May 2-3, 1978		X			X				
June 7, 1978		X			X				
July 10-12, 1978		X			X				
Aug. 7, 1978		X			X				
Aug. 30, 1978		X			X				
Nov. 2, 1978		X			X				
May 15-16, 1979		X			X				
June 18, 21, 1979		X			X				
July 23, 26, 1979		X			X				
Aug. 15-16, 1979		X			X				
Sept. 3, 1979					X				
Oct. 1, 3, 1979		X			X				
Oct. 25-26, 1979		X			X				

All sediment samples were obtained by divers using SCUBA. Four cores (sometimes 3 or 5) were taken at each station on each sampling date. A clear, acrylic tube, 23 or 30 cm long and 5 cm in diameter (tube length in 1976-77 was 23 cm), was forced about 9 cm into the sediment, stoppered at both ends, and placed upright in a plastic carrying basket.

While the sampling technique in 1978-79 was the same as in previous years, the handling of the core samples after collection was slightly different. In 1976-77, the water above the sediments in the core tube was immediately decanted and the cores frozen before preservation in 10% formalin. The organisms in the decanted water were analyzed separately from those in the sediments. In 1978-79, the core water was not decanted and some cores were never frozen but instead were preserved immediately in 10% formalin.

The preserved sediment samples were washed through screens with mesh openings of 595 μm, 250 μm, 106 μm and 45 μm. The 250 μm screen was not used in washing the 1976-77 samples. The decantation, picking, and counting of organisms followed the procedures outlined previously (Nalepa and Quigley 1980).

2.2 Species Identification and Taxonomic Notes

The taxonomic keys and identification procedures used were similar to those of the previous years (Nalepa and Quigley 1980). An additional naidid oligochaete key (Hiltunen and Klemm 1980) was used during the later stages of the 1979 sample identifications. Taxa collected in 1978-79, in addition to those already given (see Table 3, Nalepa and Quigley 1980), are presented in Table 2. One species, *Nais variabilis*, was identified using the Hiltunen and Klemm key and is most likely the species given as *Nais* sp. in the 1976-77 data report.

2.3 Biomass

Dry weight biomass was estimated by multiplying the abundance of a taxa by an estimated dry weight. The dry weight estimates were taken from Table 3 of the previous report. Taxa not collected previously (Table 2) were assigned dry weights of closely related forms of similar size.

Although oligochaete dry weights were determined from the length-weight relationships given in Table 3 of the previous report, lengths were determined a little differently. For the 1976-77 sample set, the lengths of oligochaetes were determined by projecting the oligochaete image onto a piece of paper with an overhead projector and then measuring the traced image with a wheeled map measurer. For the 1978-79 sample set, the lengths were projected using a microscope drawing tube. Using the drawing tube proved less time consuming and more precise. A further refinement was the tracing of the images before identifications were made. This allowed the matching of individual taxa to their respective projected image. As a result, oligochaete biomass in this report is subdivided by oligochaete family, whereas oligochaete biomass in the previous report was given only as the sum

Table 2. *Taxa collected in 1978-79 in addition to those collected in 1976-77.*

Oligochaeta
Nais variabilis
Specaria josinae
Chironomidae
Cladopelma sp.[1]
Paracladius sp.
Polypedilum halterale
Copepoda
Cyclopoida
Eucyclops speratus
Macrocyclops cf. *ater*
Harpacticoida
Attheyella cf. *illinoensis*
Cladocera
Moina brachiata
Pleuroxus denticulatus
Nemertea
Mysidacea
Mysis relicta

[1]See section 3.3

total. Biomass estimates of individual oligochaete fragments were placed into the most probable family as judged from distinguishable taxonomic characters.

Since two methods of sample preservation were used in 1978-79, by freezing or in formalin, the impact of these two methods on oligochaete length was evaluated. The mean length of tubificids in the frozen cores (n = 22 cores) was compared to the mean length of tubificids in the formalin preserved ones (n = 27 cores) for samples taken in 1979. Approximately equal numbers of cores were preserved by each method on each sampling date and only cores with intact individuals were included in the comparison. Tubificids retained on the

595-μm screen were tested separately from those passing through this screen (retained on the 250 and 106-μm screens). The mean length of tubificids in the formalin-preserved cores was significantly less (Mann-Whitney U-Test, $P<.05$) than the mean length of tubificids in the frozen cores for those tubificids retained on the 595-μm screen. This indicates that either formalin preservation caused body contraction or that freezing caused body extention. Because length dry weight conversions were based on the lengths of individuals freshly killed by freezing, the lengths (and thus the dry weights) of tubificids retained on the 595-μm screen from the formalin preserved cores would be underestimated. Therefore, to make the dry weights of tubificids preserved by the two methods comparable, the total length of tubificids retained on the 595-μm screen in each formalin-preserved core was multiplied by 1.87 before converting to dry weight. This correction factor is the ratio between the mean length of all tubificids in the frozen cores and the mean length of all tubificids in the formalin-preserved ones. There was no difference in the mean lengths between the two methods for those tubificids passing through the 595-μm screen. A similar comparison for the most common naidid, *Vejdovskyella intermedia*, indicated no significant differences.

It should be noted that the method of preservation had no significant effect on the percentage of tubificids retained on the 595-μm screen (Mann-Whitney U-Test, $P<.05$).

3. RESULTS

3.1 Abundance and Dry Weight Biomass

Table 3 (on microfiche on inside back cover) gives taxa abundance as the number collected in each replicate core on each sampling date in 1978 and 1979. Table 4 (on microfiche on inside back cover) gives the dry weight biomass (mg) for each of the major benthic groups in each replicate core on each sampling date.

3.2 Supplementary Tables of 1976-77 Data

For certain species of copepods and cladocerans (epibenthic taxa), abundances at Stations 4 and 7 in 1976-77 (Nalepa and Quigley 1980) cannot be directly compared to abundances in 1978-79 (this report). The first report gave abundances for only those animals collected in the sediments, while this report gives abundances for animals that were collected in both the sediments and in the water overlying the sediments (water in sediment core tube). Supplementary tables of 1976-77 data (Table 5 and Table 6, on microfiche on inside back cover) have therefore been provided which give the abundance and total dry weight of copepods and cladocerans collected in both the sediments and in the overlying water at Stations 4 and 7 (also Stations 10 and 11). Values in these tables can be directly compared to values from 1978-79 (Tables 3 and 4). Table 5 excludes those copepod and cladoceran taxa not collected in the sediment core tube water (i.e., *Eucyclops agilis, Paracyclops fimbriatus poppei, Ilyocryptus acutifrons, Ilyocryptus sordidus,* and *Leydigia quadrangularis*) because the abundances of these taxa, as given

in the previous data report, are directly comparable to abundances given in this report. Dry weights of these taxa are, however, included in the totals given in Table 6.

3.3 Corrections and Clarifications to the 1976-77 Data Report (Nalepa and Quigley 1980)

1.) *Harnischia* sp. should be *Cladopelma* sp.

2.) *Heterotrissocladius grimshawi* should be *Heterotrissocladius changi*.

3.) *Paracladopelma udine* should be *Parachadopelma undine*.

4.) No oligochaetes being reported on the Aug. 8-9, 1977 sampling date (Table 5e) implies that none were collected when, in fact, oligochaetes were collected but the data were lost.

5.) Natural logarithms were used in the length-weight regressions in Table 3.

4. REFERENCES

Hiltunen, J. K. and D. J. Klemm. 1980. A guide to the Naididae (Annelida: Clitellata: Oligochaeta) of North America. EPA-600/48031. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio. 58 p.

Nalepa, T. F. and M. A. Quigley. 1980. The macro- and meiobenthos of southeastern Lake Michigan near the mouth of the Grand River, 1976-1977. NOAA Data Report ERL GLERL 17, 12 p.